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## Patent Abstracts of Japan

PUBLICATION NUMBER : 09111401  
PUBLICATION DATE : 28-04-97

APPLICATION DATE : 17-10-95  
APPLICATION NUMBER : 07268657

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INT.CL. : C22C 38/00 C21D 8/00 C22C 38/32 C22C 38/54 C22C 38/58

TITLE : STEEL FOR MACHINE STRUCTURAL USE, EXCELLENT IN MACHINABILITY AND QUENCHING CRACK RESISTANCE, AND ITS PRODUCTION

ABSTRACT : PROBLEM TO BE SOLVED: To obtain a steel for machine structure use, having high torsional strength after induction hardening and tempering and excellent in machinability and quenching crack resistance, by specifying a chemical composition and the structure of a core part, respectively.

SOLUTION: This steel for machine structural use has a composition consisting of, by mass, 0.35-0.60% C,  $\leq 0.05\%$  Si, 0.65-1.70% Mn,  $\leq 0.020\%$  P, 0.005-0.035% S,  $\leq 0.15\%$  Cr, 0.05-0.50% Mo, 0.01-0.05% Ti, 0.01-0.05% Al,  $\leq 0.01\%$  N, 0.0005-0.0050% B, and the balance Fe and also has a structure containing bainitic phase by 5-30% by area ratio, and further, the above torsional strength is regulated to  $\geq 1400\text{MPa}$  in this steel. The quenching crack resistance of this steel can be improved to a greater extent by regulating the  $M_s$  value, defined by equation,  $M_s = 538 - 317(\%C) - 33(\%Mn) - 28(\%Cr) - 17(\%Ni) - 11(\%Si) - 11(\%Mo)$ , to  $\geq 360$ . Moreover, one or more kinds among  $\leq 1.0\%$  Cu,  $\leq 3.5\%$  Ni, 0.01-0.30% V, and 0.005-0.050% Nb can be further incorporated into the steel.

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